REMARKS

In accordance with the foregoing, claims 14-15 are amended. No new matter is presented in any of the foregoing and, accordingly, approval and entry are respectfully requested.

Claims 1-15 are pending. Reconsideration is requested.

Applicants respectively point out that both of the publications relied on by the Examiner in support of the §103(a) rejections have issued as patents, i.e., Abe (U.S.P. 7,038,142) and Nair (U.S.P. 10/703,318).

Claim Amendments

Claims 14 and 15 are amended herein to replace the term "fiberless core" with the term --metal alloy core--.

Support for the amendment is found, for example, in paragraph [0010] of the specification. No new matter is presented in any of the foregoing and, accordingly, approval and entry are respectfully requested.

Item 2: Rejection of Claims 14-15 Under 35 U.S.C. §112, first paragraph and second paragraph

In item 2, page 2 of the Office Action, the Examiner rejects claims 14-15 under 35 U.S.C. §112, first paragraph, as failing to comply with the enablement requirement and in item 3, page 2 rejects claims 14-15 under 35 U.S.C. §112, second paragraph as being indefinite. The Examiner asserts that the term "fiberless core" is not supported in the specification. (Action at page 2, lines 13 and 19).

Claims 14 and 15 are amended herein to replace the term "fiberless core" with the term --metal alloy core--. Support for the amendment is found, for example, in paragraph [0010] of the specification.

Applicants submit that claims 14-15 comply with 35 U.S.C. §112, first paragraph and second paragraph and request withdrawal of the rejection.

Item 4: Rejection of claims 1-10 under 35 U.S.C. §103(a)

In item 4 of the Office Action, the Examiner rejects claims 1-10 under 35 U.S.C. §103(a) as being unpatentable over Abe (U.S. Pub. 2003/0136577). (Action at pages 3-5). The rejection is traversed.

Independent claim 1 recites a semiconductor device substrate comprised of a core substrate having, on both main surfaces of which, respective interconnect patterns extending

through resin layers, "wherein: the core substrate being of a material having a heat expansion coefficient closer to that of a semiconductor chip than the respective heat expansion coefficients of the resin layers and the interconnect patterns, and a resin layer, forming an outermost layer of the semiconductor device substrate on each of the main surfaces thereof, of a material having at least one of a higher strength and a higher elongation than a resin material used for inner resin layers of the semiconductor device substrate and preventing cracking and deformation, of the semiconductor device substrate due to thermal stress occurring between two or more of the core substrate, the inner resin layers, and the interconnect patterns in the semiconductor device substrate." (emphasis added). Independent claims 5 and 9 have similar recitations.

That is, according to independent claims 1, 5, and 9, the specific characteristics of strength and/or elongation of the outermost resin layer are different from the specific characteristics of strength and/or elongation of the inner resin layer. Applicants submit that Abe does not teach that the specific characteristics of strength and/or elongation are different respectively for an outermost resin layer and inner resin layer.

In support of the rejection, the Examiner asserts it would have been obvious:

> . . . [T]o construct the invention of Abe with the selection of materials as provided in Table 1, since it is . . . prima facie obvious to an artisan for optimization and experimentation to select the available materials in Table 1 for the advantage of preventing cracking, deformation, and other problems arising in the substrate due to the thermal stress occurring between the core substrate and substrate and the inner resin layers in the substrate and interconnect patterns in the substrate. . . .
>
> . . . The resin layer . . . may be selected among the disclosed group of materials . . . so as to provide to provide the outermost layer with the higher strength and elongation than the inner layer because the results are predictable.

(Action at page 4, lines 12-21).

Further, in the Action at page 6 entitled: "Response to Arguments" (of the previous Amendment filed on July 16, 2007), the Examiner asserts:

> . . . [T]he . . . selection of material for the insulating layer is obvious because the result is predictable. . . . the court has foreclosed the argument that a specific teaching, suggestion, or motivation is required to support a finding of obviousness. (see *KSR International Co. v. Teleflex Inc., 550* U.S. - , 82 USPQ2d 1385 (2007)).

(Action at page 6, lines 10-23).

Applicants submit that the Examiner's assertions are in error and the Examiner is misapplying the holdings of *KSR International*.

In *KSR International*, the U.S. Supreme Court held that in determining obviousness, one also "must ask whether the improvement is more than the predictable use of prior art elements

according to their established functions (emphasis added)" slip op. 13, 82 USPQ2d at 1396. Furthermore, it is necessary "to determine whether there was an apparent reason to combine the known elements in the fashion claimed" slip op. 14, 82 USPQ2d at 1396.

Applicants submit that there is no "rational underpinning" to support the modification of Abe, as the Examiner asserts.

The Supreme Court further affirmed the *KSR International* holdings in *In re Kahn,* 441 F. 3d 977, 988 (CA Fed. 2006), stating: "[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." (Emphasis added).

Applicants submit that the Examiner's assertions in item 4, for example, that "resin layers . . . may be selected among the disclosed group of materials . . . so as to provide the outermost layer with the higher strength and elongation than the inner layer because the results are (merely) predictable" are merely conclusory and without articulated reasoning.

The Examiner is, in essence, asserting that any art which merely published a listing of elements teaches all and any such further use of such elements - -which is clearly not the case and not supported by KSR.

By contrast, Abe is specifically directed to a core substrate "formed of a fiber reinforced metal." (see, for example, paragraph [0013]). All advantages discussed by Abe over the prior art are directed to Abe's teaching of a use of fibers. (see, for example, paragraph [0054]).

In addition, while the Examiner asserts that it would have been obvious to modify Abe for "preventing cracking . . . arising in the substrate due to the thermal stress occurring between the core substrate and the inner resin (emphasis added)," Abe does not address cracking, at all. By contrast, Abe teaches:

> the core layer includes carbon fibers, whereby thermal expansion coefficient changes of the circuit board can be small, and a mechanical strength of the circuit board can be improved. Thus, the generation of deformations (strains, bowing, etc.) of the circuit board can be prevented, and the connection reliability . . . can be improved.

(see, paragraph [0017]).

A selection of materials for "preventing cracking" is recited in claim 1 of the present invention.

That is, the teaching of Abe is directed towards preventing strains and bowing and in support of a modification of Abe, and the Examiner is asserting a motivation to address a

problem not discussed by Abe, but only by the present invention.

Applicants further submit to the Examiner that this traversal meets the Consideration of Applicant's Rebuttal Evidence Examination Guidelines for Determining Obviousness Under 35 U.S.C. 103 in View of the Supreme Court Decision in KSR International Co. v. Teleflex Inc. of October 3, 2007.

Applicants submit that one of ordinary skill in the art would not have modified Abe in a manner as the Examiner suggests, the elements in combination do not merely perform the function that each element performs separately, and the results of the claimed combination were unexpected.

Summary

Since the Examiner's assertions are in error and *prima facie* obviousness is not established, the rejection of claim 1-10 should be withdrawn and claims 1-10 allowed.

Item 5: Rejection of claims 11-15 under 35 U.S.C. §103(a)

In item 5 at pages 5-6 of the current Office Action, the Examiner rejects claims 11-15 as being unpatentable over Abe in view of art Nair (U.S. Pub. 2004/0095734). The rejection is traversed.

Independent claim 11 recites a semiconductor device substrate wherein "the core substrate. . . [is]. . . a metal alloy having a heat expansion coefficient closer to that of a semiconductor chip than the respective heat expansion coefficients of the resin layers and the interconnect patterns." (emphasis added). Independent claims 13 and 14 have similar recitations.

Dependent claim 12 recites a semiconductor device substrate according to claim 11, wherein "the metal alloy. . . [is]. . . an iron-nickel alloy." (emphasis added). Dependent claim 15 has a similar recitation.

The Action concedes that Abe does not teach a "core substrate being of a metal alloy." (Action at page 6, lines 1-2). However, the Examiner asserts that Nair teaches:

> an analogous device having a core substrate . . . made of an iron-nickel alloy . . . for providing a high capacitance substrate. . . . it would have been obvious . . . to [sic- modify] material of the core substrate of Abe with the iron nickel alloy material, as taught by Nair, for providing the advantage as mentioned in the above.

(Action at page 6, lines 5-8).

Applicants submit the Examiner is in error in his assertion that there is a reasonable chance of success to combine the art in a manner as he suggests.

Claim 11, for example, recites a "core substrate being of a metal alloy having a heat expansion coefficient closer to that of a semiconductor chip than the respective heat expansion coefficients of the resin layers and the interconnect patterns."

The Examiner asserts Abe teaches "the invention substantially as claimed, except that the core substrate being of a metal alloy" and it would have been obvious to use an iron-nickel alloy material in Abe.

Applicants submit that the Examiner's assertions are in error since the Examiner specifically teaches that:

> As shown in Table 1, the thermal expansion coefficients of the metal materials are larger than the thermal expansion coefficient 3.5 ppm/.degree. C. of silicon, but the thermal expansion coefficient of carbon is 0 2 ppm/.degree. C., which is smaller than that of silicon. The thermal expansion coefficient of SiC is substantially equal to that of silicon. Accordingly, it is found that a composite material of the metal material and the fiber material is formed to thereby form the core substrate of a thermal expansion coefficient which is approximate to that of silicon.

(Emphasis added, See, paragraph (0053)).

That is, Abe teaches that a metal alloy has a thermal coefficient expansion that is larger than the thermal expansion coefficient of silicon and, for a core substrate to have a thermal expansion coefficient substantially equal to that of silicon, the core substrate needs to be a composite material.

Thus, the Examine is in error to assert it would not have been reasonable to modify the composite material core substrate disclosed by Abe to be an iron-nickel alloy material.

Applicants submit that one of ordinary skill in the art would not have combined Abe and Nair in a manner as the Examiner suggests, the elements in combination do not merely perform the function that each element performs separately, and the results of the claimed combination were unexpected.

Summary

Since the Examiner's assertions are in error and *prima facie* obviousness is not established, the rejection of claim 11-15 should be withdrawn and claims 11-15 allowed.

CONCLUSION

There being no further outstanding objections or rejections, it is submitted that the application is in condition for allowance. An early action to that effect is courteously solicited.

If there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

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